AMSC terminals in one Globalstar beam could cause unacceptable interference. Again, this is a reasonable number of AMSC terminals to assume in one Globalstar beam.

2.2 AMSC carriers appearing as in-band noise after L-to-C band upconversion:
This interference effect, which is not immediately obvious, is a result of the very real limitations imposed by state-of-the-art filter technology and system cost. Because Globalstar achieves spectral efficiency by reusing the 16.5 MHz L-band frequency in each of its 16 beams, and the Globalstar satellites are transponding satellites, each beam is assigned a separate 16.5 MHz sub-band of the C-band feederlink band. To minimize the feederlink bandwidth required, there is minimal guard-band (2.88 MHz) between adjacent sub-bands. Therefore, any carriers that are in one L-band beam, operating between 1629.5 to 1646 MHz will appear, at the gateway, as in-band interference in the adjacent beam's feederlink sub-band, as shown by the vertical arrows in Fig.1. (AMSC has said it will operate only above 1631.5 MHz, but even carriers above 1631.5 MHz will fall in the Globalstar feederlink sub-band shown as corresponding to beam 2 in the figure.) Filtering on board the satellite mitigates against such interference, but considerations of size, weight and cost limit the rejection that can realistically be achieved.

Assuming that an AMSC terminal has an in-band interference density of 14 dBW/4 kHz, antenna sidelobe isolation of 13 dB and cross-polarization isolation of 6 dB, leads to -5 dBW/4 kHz per carrier at the earth's surface. Allowing for filter rejection, each terminal appears as an in-band interference density equivalent to around -40 dBW/4 kHz on the earth's surface. As in Section 2.1, the acceptable level of interference density is -25.3 dBW/4 kHz, so about 30 AMSC terminals with carrier frequencies lying in a 1.23 MHz bandwidth, transmitting in one Globalstar beam, will cause more degradation to Globalstar than the allowable 6 % delta T/T .

3. Summary
AMSC terminals operating in the lower L-band will cause unacceptable degradation to Globalstar users in the 1610-1626.5 MHz band, in which MSS operation has a primary status. Interference from AMSC's operation in the lower L-band due to out-of-band emissions would vary depending upon the number of mobile earth terminals in a beam and the frequency of the Globalstar channel being analyzed. Interference due to AMSC carriers upconverted into an adjacent Globalstar beam's feederlink subband can be caused by 30 AMSC carriers transmitting in one Globalstar beam.
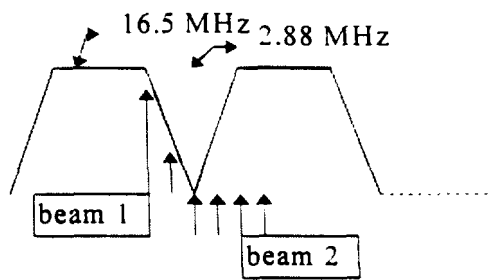
Fig. 1: Feederlink sub-bands for adjacent L-band beams in Globalstar

AMSC out-of-band emissions into Globalstar

Quantity	Value	Units	Comments
Frequency	1625.8	MHz	
Satellite altitude	1414.0	km	
Elevation angle	50.0	degrees	
Range	1740.5	km	
Free space loss	-161.4	dB	
Polarization isolation	-6.0	dB	Average over beam
Sat. antenna gain	15.7	dB	Antenna is approx. iso-flux,
Line loss	-1.1	dB	so gain*space loss is constant
System noise temp. (at LNA)	500.0	K	
Thermal noise density	-201.6	dBW/Hz	
Allowable interference density at LNA	-214.1	dBW/Hz	Using 6 % delta T/T
Allowable interf. density at earth surface	-25.3	dBW/4 kHz	
Emission density from an AMSC terminal	-46.8	dBW/4 kHz	
Allowable number of terminals in one beam	141.2		
Typical area of Globalstar beam	300000.0	sq.nmi	

Globalstar

P.O. Box 640670, San Jose, CA 95164-0670

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September 25, 1995

DECLARATION

I am the technically qualified person responsible for preparation of the foregoing engineering statement. I am familiar with Part 25 of the Commission's Rules and the technical parameters discussed in the Statement.

I declare the foregoing is true and correct to the best of my knowledge, information and belief.

Signed this 25th day of September, 1995.

Vijaya K. Gallagher

Systems Analysis Manager

Globalstar

ATTACHMENT B

LQP response to Rockwell comments on LQP interference analysis

Rockwell commented on LQP's interference analysis of October 10, 1995; in its comments, Rockwell stated that LQP's analysis was too pessimistic, and that with the proper calculation, the harmful interference to Globalstar is shown to be eliminated or significantly reduced. LQP's response to these comments follows.

Out-of-band emissions

If every Rockwell MET does meet the out-of-band emission mask specified by Rockwell in its calculations, (of which LQP would need some proof), the analysis method used by Rockwell would be valid only under operational scenarios that would guarantee that the frequencies of their METs transmitting in one Globalstar beam are uniformly distributed through their assigned frequency band. Rockwell has provided no details of their frequency assignment scheme to show what the frequencies assigned to the METs in one Globalstar beam would be. Therefore, it is reasonable to consider one MET transmitting simultaneously in each of the possible channels; Rockwell does this in their response, but calls it an extreme situation.

Further, LQP may use the 1.25 MHz channel closest to 1626.5 MHz, in the event that no TDMA system goes forward, or in the case where Globalstar is authorized to serve a territory adjacent to the US, and an AMSC beam overlaps a Globalstar beam.

In this case, using the Rockwell emission mask and summation over 6800 channels, as in their response, leads to an interference density of -22.6 dBW/3 kHz, which is 4 dB higher than the level at which the interference into Globalstar is 6% of the thermal noise level. It should also be noted that the 6 % is a somewhat arbitrary level; in fact Globalstar believes a 2 % number is more appropriate, since Globalstar is primary in the 1610-1626.5 MHz band, and Rockwell has received an 'interim' authorization.

On the other hand, since Rockwell is authorized only above 1631.5 MHz, the summation carried out by Rockwell in their response is too pessimistic, since they assumed they were operating down to 1626.5 MHz. If operation is restricted to 1631.5 MHz and above, the summation leads to acceptable interference (less than 2 %). Therefore, the issue of out-of-band emissions from Rockwell METs is not a concern if they restrict operation to frequencies above 1631.5 MHz and meet the emission mask specified by them in their response to LQP's analysis. However, in-band carrier effects, discussed in the next section, are a matter of concern to LQP.

In-band carrier effects on Globalstar satellite

If the Rockwell MET's EIRP is 8 dB lower than LQP assumed, ie they operate at 6 dBW/4kHz, with 5 kHz spacing for their carriers, then the Rockwell analysis shows that

187 of their carriers in 1.25 MHz in one Globalstar beam could cause a 6 % increase in Globalstar's thermal noise floor. In fact, using a 2% criterion, only 62 Rockwell METs simultaneously operating in one 1.25 MHz channel in one Globalstar beam could cause harmful interference to Globalstar. Rockwell states that 187 carriers in one beam in 1.25 MHz is an unlikely situation; however it is possible. Certainly, 62 such carriers is even more likely. There is no indication that they can or will set up their frequency assignments in such a way as to limit to 62 the number of their carriers in one of Globalstar's beams in 1.25 MHz.

Conclusions
It is possible, depending on the frequency management scheme, for Rockwell METs to cause harmful interference into Globalstar.

April 8, 1996

DECLARATION

I am the technically qualified person responsible for preparation of the foregoing engineering statement. I am familiar with Part 25 of the Commission's Rules and the technical parameters discussed in the Statement.

I declare that the foregoing is true and correct to the best of my knowledge, information and belief.

Signed this 8 th day of April, 1996.

Vijaya K. Gallagher
Systems Analysis Manager
Globalstar

CERTIFICATE OF SERVICE

I hereby certify that a true and correct copy of the foregoing Comments of

L/Q Licensee, Inc. and Opposition to Proposed Modification of License was sent by

hand delivery (indicated by *) or by first-class mail, postage prepaid, this 3rd day

of September, 1996, to each of the following:

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*Commissioner James H. Quello
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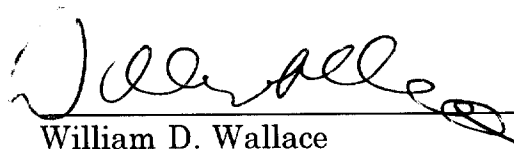2300 N Street, N.W.
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